AD-A197 434

DTIC FILE COPY

(1)

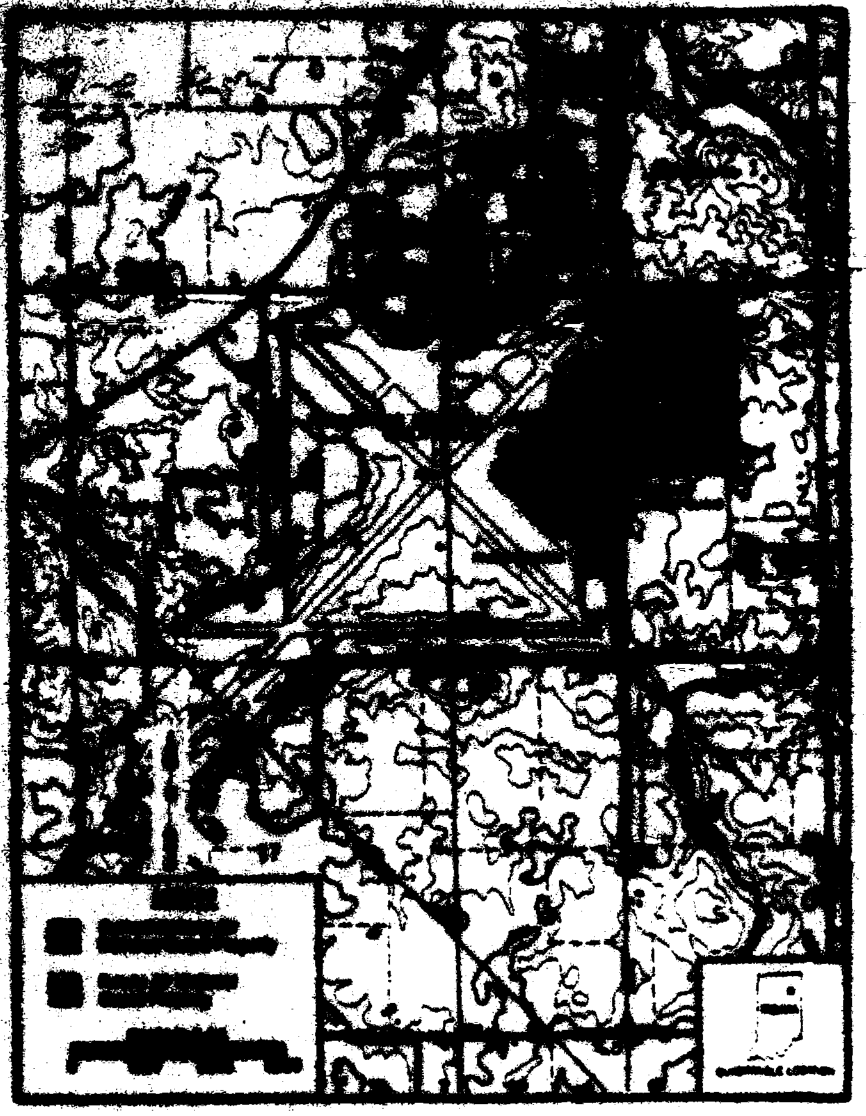
INSTALLATION RESTORATION PROGRAM

Preliminary Assessment

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

Hazardous Materials Technical Center
April 1988

88 6 30 091



This report has been prepared for the National Guard Bureau, Andrews Air Force Base, Maryland by the Hazardous Materials Technical Center for the purpose of aiding in the implementation of the Air Force Installation Restoration Program.

DISTRIBUTION: Approved for public release; distribution is unlimited.

1

INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

FOR

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

April 1988

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331

Prepared by

Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, Maryland 20852

Contract No. DLA 900-82-C-4426

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in October 1987 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 122nd Tactical Fighter Wing, Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana (hereinafter referred to as the Base) under Contract No. DLA-900-82-C-4426. The Preliminary Assessment included:

- o an onsite visit including interviews with 22 past and present Base employees conducted by HMTC personnel during 2-6 November 1987;
- o the acquisition and analysis of pertinent information and records on the use of hazardous material and generation and disposal of hazardous waste at the Base;
- o the acquisition and analysis of available geological, hydrological, meteorological, and environmental data from pertinent Federal, State, and local agencies; and
- o the identification of sites on the Base that may be potentially contaminated with hazardous material/hazardous waste (HM/HW).

B. Major Findings

Past Base operations involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. The major operations of the Base that have used and disposed of these materials and wastes are aircraft maintenance, weapons maintenance, aerospace ground equipment maintenance, liquid fuels management, and vehicle maintenance. These operations involve corrosion control, nondestructive inspection, fuel cell maintenance, engine maintenance, and pneudraulics. Waste oils, recovered fuels, spent cleaners, strippers, and solvents were generated by these activities.

Interviews with 22 past and present Base personnel (average of 24 years experience) and a field survey resulted in the identification of four disposal and/or spill sites at the Base that are potentially contaminated with HM/HW. These sites were assigned a Hazard Assessment Score (HAS) according to the U.S.

U.S. Air Force Hazard Assessment Rating Methodology (HARM). The four sites are as follows:

Site No. 1 - Old Fire Training Areas (HAS-55)

Three former fire training areas (FTAs) are located south of the Hush House (Building No. 771). These areas were used from the late 1950s to 1972. About 500 gallons of flammable liquids, including jet fuel, leaded AVGAS, and waste oils, were burned each year at the FTAs, for a total of about 9,500 gallons. Assuming at least 70% of the flammable liquids were burned, 2,850 gallons may remain in the soils at this site.

Site No. 2 - Old Motor Pool Area (HAS-54)

PCB transformers were stored by the city of Fort Wayne on the concrete slab of the old motor pool building. The transformers leaked and the transformer oil ran off the slab into the grass and into an abandoned underground heating oil tank. Bordering the slab are areas of dead grass.

Site No. 3 - Hazardous Waste Collection Area (HAS-54)

Behind Building No. 760 is an area that has been used for the collection and storage of hazardous wastes from various nearby shops since 1954. In the past, full drums were picked up by a contractor. Since 1985, full drums have been moved to a storage area near Building No. 301 and picked up by the Defense Reutilization and Marketing Office (DRMO). The area is gravelled and enclosed by a wooden fence; the gravel is very stained and the area smells heavily of oils and solvents. Wastes stored here include 7808 oil, hydraulic oil, PD-680 solvent, paints, and thinners.

Site No. 4 - POL Spill Area (HAS-59)

In 1968, a malfunction in the POL system resulted in a 5,000-gallon JP-4 spill. The spill flowed eastward out of the POL area, into nearby woods, and through the storm drainage system to Harber Ditch. Water was pumped into the creek to dilute the JP-4 as it flowed north toward the City of Fort Wayne.

C. Conclusions

Information obtained through interviews with past and present Base personnel resulted in the identification of four areas on the Base that are potentially contaminated with HM/HW. At each of the identified sites, the potential exists for contamination of surface water, soils, or groundwater and subsequent contamination migration. Each of these sites was therefore assigned a HAS according to HARM.

D. Recommendations

Further IRP investigation is recommended for each of the four identified sites.

I. INTRODUCTION

A. Background

The 122nd Tactical Fighter Wing (TFW) is located at the Indiana Air National Guard Base at the Fort Wayne Municipal Airport, Fort Wayne, Indiana (hereinafter referred to as the Base). The 122nd TFW was established at Fort Wayne in 1954. Past operations at the Base have involved the use and disposal of materials and wastes that subsequently have been categorized as hazardous. Consequently, the National Guard Bureau has implemented its Installation Restoration Program (IRP). The IRP consists of the following:

- o Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- o Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a remedial action through preparation of a feasibility study.
- o Research, Development and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- o Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and implement remedial action.

B. Purpose

The purpose of this Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base, reviewed existing environmental information, analyzed the Base records concerning the use and generation of hazardous material/hazardous waste (HM/HW), and conducted interviews with Base personnel who are familiar with past and present HM/HW management activities. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base, with special

emphasis on the history of the shop operations and their past HM/HW management procedures; the local geological, hydrological, and meteorological conditions that may affect migration of contaminants; the local land use, public utilities, and zoning requirements that affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and includes:

- An onsite visit;
- The acquisition of pertinent information and records on hazardous materials use and hazardous wastes generation and disposal practices at the Base;
- The acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat, and utility data from various Federal, State, and local agencies; (JES)
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions.

The onsite visit and interviews with past and present Base personnel were conducted during the period 2-6 November 1987. The Preliminary Assessment site visit was conducted by Ms. Janet S. Emry, Hydrogeologist/Task Manager; Ms. Natasha M. Brock, Environmental Scientist; Ms. Kathryn Gladden, Chemical Engineer; and Dr. Naichia Yeh, Environmental Scientist. Other HMTC personnel who assisted with the Preliminary Assessment include Mr. Raymond G. Clark, P.E./Department Manager and Mr. Mark Johnson, Geologist/Program Manager (Appendix A).

Individuals from the Air National Guard who assisted in the Preliminary Assessment included Mr. Daniel Waltz, Hydrogeologist/Primary Project Officer (ANGSC/DER) and selected members of the 122nd TFW. The Point of Contact (POC) at the Base was Maj. John Loehle, Base Civil Engineer (122 CES/DE).

D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent site specific information and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the installation that may use hazardous material or generate hazardous waste. Next, an evaluation of both past and present HM/HW handling procedures at the identified locations is made to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews also define the areas on the Base where any HM/HW, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or otherwise released into the environment.

Historic records contained in the Base files are collected and reviewed to supplement the information obtained from interviews. Using this information, a list of past waste spill/disposal sites on the Base is identified for further evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

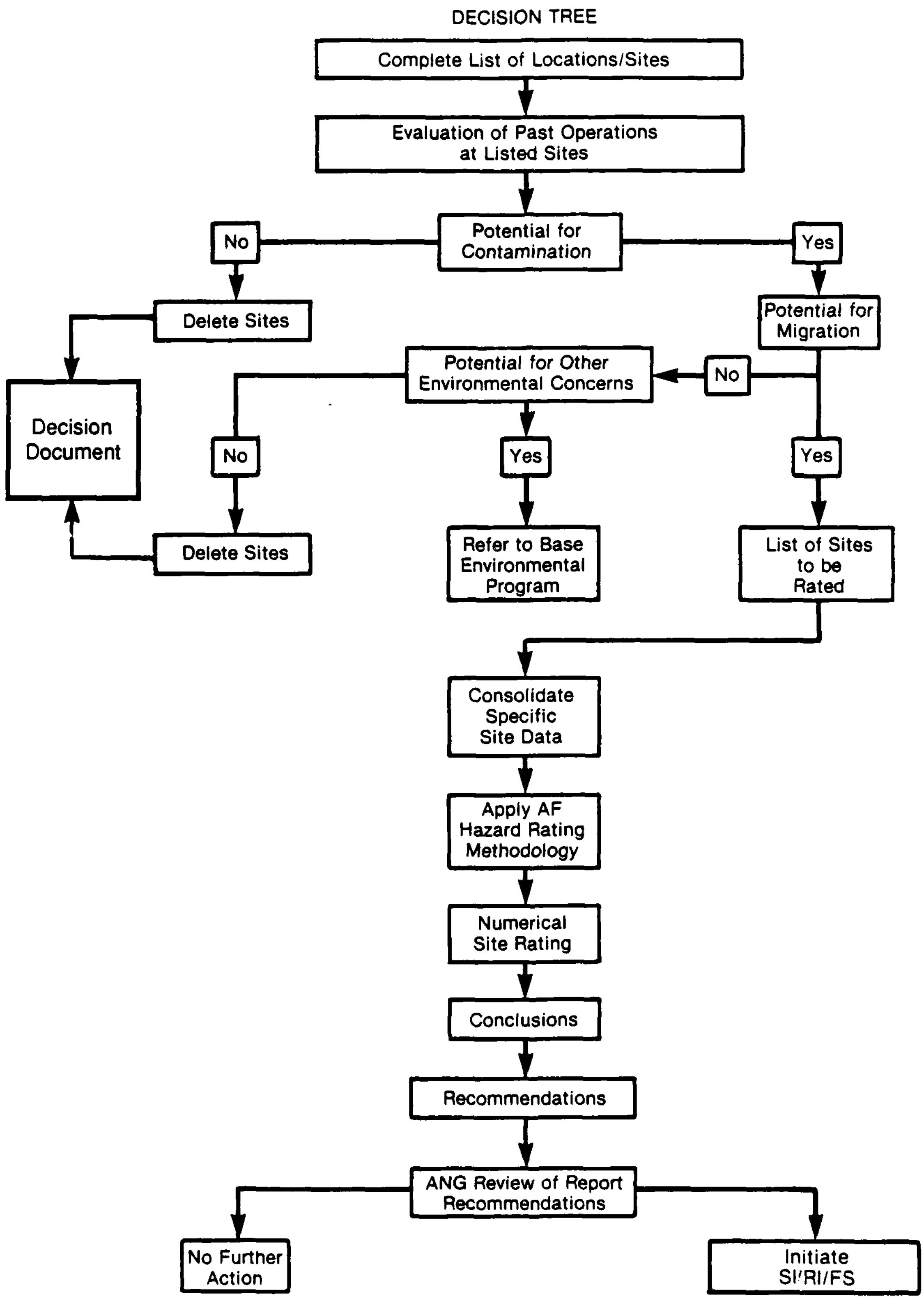
Detailed geological, hydrological, meteorological, development (land use and zoning), and environmental data for the area of study is also obtained from appropriate Federal, State, and local agencies (Appendix B). Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal may have occurred. Where sufficient information is available, sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not negate a recommendation for further IRP investigation, but rather indicates a lack of data. The HAS is computed from the data included in the Factor Rating Criteria (Appendix D).

HMTC

PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.

Preliminary Assessment Methodology Flow Chart.



II. INSTALLATION DESCRIPTION

A. Location

The 122nd TFW of the Indiana Air National Guard is located at Fort Wayne Municipal Airport, which is within the city of Fort Wayne. The western portion of the Base is also within the city of Fort Wayne; the eastern portion is within Allen County, Indiana. Commercial property immediately surrounds the airport to the west, north, and east. Property south of the airport is largely agricultural.

The Base currently occupies a total of 87 acres on the eastern side of the airport. Negotiations are underway to obtain additional parcels of land; these additions will increase the size of the Base to 165 acres (Development Plan, 1986). Figure 2 shows the location and current and future boundaries of the Base property covered by this Preliminary Assessment.

B. Organization and History

The present Indiana Air National Guard began as the 113th Observation Squadron, formed in 1921 near Kokomo, Indiana. In 1946, as part of the national reorganization of the Guard, the 122nd Tactical Fighter Group was organized at Stout Field, Indianapolis, Indiana.

On 10 November 1947, the 163rd Fighter Squadron was organized at Baer Field, Fort Wayne, Indiana, under the command of Maj. William R. Sefton. In 1951, the Indiana Air National Guard, under the command of Col. Allison Maxwell, was mobilized for active duty for the Korean conflict.

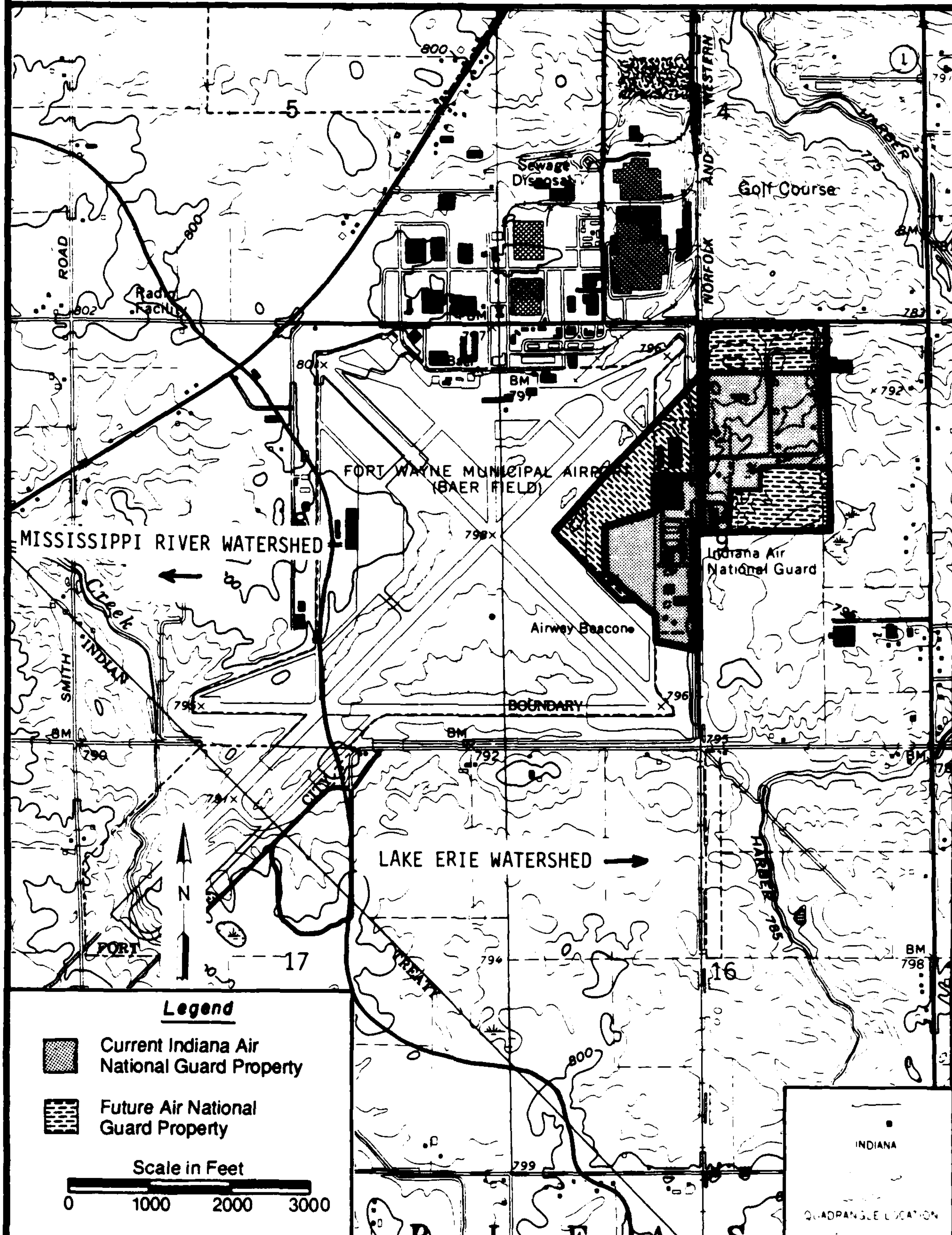
In 1954, the 122nd Air Base Group, the 122nd Tactical Hospital, the 122nd Maintenance and Supply Group, and the 122nd Tactical Fighter Wing Headquarters with all its subordinate squadrons were transferred to Fort Wayne. The Wing's first jet aircraft, the F-80 Lockheed "Shooting Star" was assigned the same year. In 1956, the Wing converted to the F-86 "Sabre" and 2 years later to the F-84F "Thunderstreaks."

HMTC

Source: U.S.G.S.
Ossian, Indiana
Quadrangle Map, 1981.

Figure 2.

Location Map of Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana.



In October 1961, the 122nd Tactical Fighter Wing was again called to active service during the Berlin Crisis. The Wing was deployed to Chambley, France until August 1962.

In 1971, the unit converted to the F-100 "Super Sabre" aircraft, and in 1979 to the F-4C "Phantom." Since 1982, the 122nd Tactical Fighter Wing Headquarters has had command of four flying groups: the 122nd in Fort Wayne; the 181st Tactical Fighter Group, Terre Haute, Indiana; the 188th Tactical Fighter Group, Fort Smith, Arkansas; and the 149th Tactical Fighter Group, Kelly Air Force Base, Texas. Since December 1985, the Wing has flown the F-4E "Phantom."

III. ENVIRONMENTAL SETTING

A. Meteorology

The climate of Allen County, Indiana is mid-continental, characterized by wide variations in temperature from winter to summer and fairly uniform distribution of precipitation throughout the year. Mean yearly temperature is about 50° F; average minimum temperature in the winter is 22° F and average maximum temperature in the summer is 81° F. Precipitation averages 35.3 inches per year (National Oceanic and Atmospheric Administration, 1986). Net precipitation is +3.3 inches per year, according to the method out-lined in the Federal Register (47 FR 31224). Rainfall intensity based on 1 year, 24-hour rainfall is 2.3 inches (calculated according to 47 FR 31235).

B. Geology

Fort Wayne, Indiana, is located within the Central Lowland physiographic province of the Great Plains. The Central Lowlands are characterized by level to gently undulating uplands that are dissected by steep drainageways. The topography of the Base is nearly level, at elevations ranging from 795 feet above mean sea level (MSL) in the western portion of the Base to 785 feet MSL in the eastern portion.

The uplands in the vicinity of the Base are part of the Tipton Till Plain, formed of unconsolidated glacial till which was deposited directly by ice during the Pleistocene epoch. This till, which is a ground moraine deposit composed predominately of silt and clay, is the New Holland Till member of the Lagro Formation. Beneath the Base, this unit is about 30 feet thick. Underlying the Lagro Formation is approximately 50 feet of an older Pleistocene till known as the Trafalgar Formation. The Trafalgar Formation is an overconsolidated clay-rich till containing scattered thin beds of sand, silt, and gravel (Bleuer and Moore, 1978).

Immediately underlying the Trafalgar Formation at the Base are the Traverse and Detroit River Formations, which are Devonian in age and consist of up

to 145 feet of limestones and dolomites. These rocks dip slightly toward the north, toward the center of the Michigan Basin. Below these formations is a thick sequence of northwardly-dipping dolomites, limestones, and shales of Silurian to Cambrian age. Precambrian volcanic basement occurs at a depth of about 3,000 feet (Bleuer and Moore, 1978).

C. Soils

According to the U.S. Department of Agriculture Soil Conservation Service, the soils at the Base belong to the Blount-Pewamo Association. The Blount soil is a deep, somewhat poorly drained silt loam which occurs on upland till plains throughout Allen County. The surface layer of the Blount soil is a dark grayish-brown silt loam about 9 inches thick. The subsoil consists of 4 inches of grayish-brown silty clay loam containing faint yellowish-brown mottles, underlain by 5 inches of dark brown silty clay. The substratum consists of 9 inches of dark grayish-brown clay and 13 inches of calcareous dark grayish-brown silty clay loam with distinct yellowish-brown mottles. Permeability of the Blount soil is 5.6×10^{-4} cm/sec to 1.8×10^{-3} cm/sec.

The Pewamo soil is a deep, poorly drained silty clay loam which occurs on flats and in shallow depressions in the uplands. The surface layer of the Pewamo soil is a very dark gray silty clay loam about 10 inches thick. The subsoil consists of 10 inches of dark gray light silty clay with distinct yellowish-brown mottles, underlain by 9 inches of mottled dark grayish-brown silty clay. The substratum consists of 21 inches of mottled grayish-brown heavy silty clay loam and 10 inches of mottled calcareous grayish-brown clay loam. Permeability of the Pewamo soil is 1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec.

D. Hydrology

Surface Water

According to the Federal Emergency Management Agency, the Base is not within a 100-year floodplain. The surface water divide between the Lake Erie Watershed and the Mississippi River Watershed passes through Allen County,

Indiana just west of the Base (approximate location shown in Figure 2). Water from most of the county drains into the Maumee River, which is part of the Lake Erie watershed. The Maumee River is formed by the confluence of the St. Marys River, which drains much of the southern part of the county, and the St. Joseph River, which drains much of the northern part of the county. The far western one-fourth of the county is drained by the Little River and the Eel River, both of which are part of the Mississippi River watershed. Water to supply the city of Fort Wayne is taken from the St. Joseph River. At present, an average of 20.36 million gallons a day is pumped from a reservoir near Cedarville (Kirschner and Zachary, 1969).

The Base is within the Lake Erie watershed. Surface drainage from the Base flows into Harber Ditch, and then north through the city of Fort Wayne and into the St. Marys River. Storm drainage from the Base also discharges into Harber Ditch.

Groundwater

Groundwater in Allen County is obtained from both the surficial unconsolidated glacial sediments and the underlying carbonate bedrock. The glacial aquifers are commonly sandy glacial drift and lenses of sand and gravel which occur within clayey glacial till (Bleuer and Moore, 1987). The water table occurs at a depth of 20 to 30 feet within these deposits. Rural towns, farms, some suburban developments, and certain industrial facilities depend on groundwater; slightly more than half the groundwater used is pumped from wells that are completely within the glacial drift. None of these wells has the capacity to supply an extremely large amount of water, but they supply enough to meet domestic and light agricultural needs (Kirschner and Zachary, 1969). Some residences near the Base obtain potable water from wells within the glacial aquifer. The nearest well is located 1,300 feet south of the Base.

In the vicinity of the Base, however, the bedrock is the major aquifer. The aquifer consists of limestones and dolomites with sufficient fractures and cavities to hold and conduct water. Wells are completed in this aquifer not only because it is shallow, but also because the thin overlying glacial till

contains a very small percentage of sand and gravel. The clayey surficial tills beneath the Base are estimated to have hydraulic conductivities between 10^{-6} cm/sec and 10^{-4} cm/sec (Fetter, 1980). The limestone probably acts as an aquifer to a depth of 200 to 300 feet below the bedrock surface; at this depth, the hydraulic conductivity of the limestone is low enough that the underlying limestone may be excluded from the flow system. Hydraulic conductivity of the limestone aquifer is estimated to be 3.5×10^{-3} cm/sec to 5.3×10^{-3} cm/sec (Planert, 1980). Industries and the municipalities are generally supplied from wells drilled into the limestone bedrock. These wells are 100 to 400 feet deep, and they produce as much as 500 gallons a minute (Kirschner and Zachary, 1969).

Although the surficial glacial deposits and underlying limestone aquifer are hydraulically interconnected, the possibility of groundwater contamination from the surface is small, due to the slow permeability of the clayey till. In Allen County, groundwater within both aquifers converges on the valleys of Little River, St. Marys River, St. Joseph River, and Maumee River (Bleuer and Moore, 1978). Beneath the Base, therefore, groundwater flow is toward the northeast or east, toward St. Marys River.

E. Critical Habitats/Endangered or Threatened Species

According to the Indiana Department of Natural Resources, there are no endangered or threatened species of flora or fauna within a 1-mile radious of the Base. Furthermore, there are no critical habitats, wetlands, or wilderness areas near the Base.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. A total of 22 past and present Base personnel, with an average of 24 years experience, were interviewed. These personnel were representative of POL Management, Civil Engineering, Fire Department, Motor Pool, Hydraulic Shop, Engine Shop, Aerospace Ground Equipment Maintenance, Corrosion Control, Weapons Maintenance, Fabrication Shop, Machine Shop, Supply, and Aircraft Maintenance. Table 1 summarizes these major operations, provides estimates of the quantities of waste currently being generated, and describes the past and present disposal methods for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible quantities of wastes ultimately requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with Base personnel and one airport employee and subsequent site inspections resulted in the identification of four sites potentially contaminated with HM/HW. Figure 3 illustrates the location of the identified sites. The four sites were scored using HARM (Appendix C). Copies of the completed Hazardous Assessment Rating Forms are found in Appendix D. Table 2 summarizes the HAS for each of the scored sites.

The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a given radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). Brief descriptions of all the sites follow.

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	ESTIMATED QUANTITIES (GALLONS/YEAR)	METHODS OF TREATMENT/STORAGE/DISPOSAL (1950–1987)
Aircraft Maintenance	734	PD-680 Solvent	600	1950–1960 CONTR
		PD-680 Solvent	260	1960–1980 CONTR; 1980–1987 DRMO
		JP-4	1,000	1950–1960 FTA
		JP-4	2,205	1960–1987 FTA
		Strippers (MEK, MIK)	200	1950–1960 STORM
		Strippers (MEK, MIK)	75	1960–1980 CONTR; 1980–1987 DRMO
		1010 Oil	252	1950–1960 FTA
		7808 Oil	252	1960–1980 CONTR; 1980–1987 DRMO
		Engine Oil	300	1950–1960 CONTR
		Engine Oil	165	1960–1980 CONTR; 1980–1987 DRMO
		Hydraulic Oil	280	1950–1980 CONTR; 1980–1987 DRMO
		Cleaning Compound	220	1950–1980 STORM; 1980–1987 SAN
		Paint Thinner	175	1950–1980 CONTR; 1980–1987 DRMO
Non-Destructive Inspection	734	Penetrant	0.25	1980–1987 SAN
		Emulsifier	0.25	1980–1987 SAN
		Developer	40	1980–1987 SAN
		Fixer	40	1980–1987 SIL REC
Corrosion Control	764	Thinners	100	1950–1980 CONTR; 1980–1987 DRMO
		Paint Stripper	2	1950–1980 CONTR; 1980–1987 DRMO
		Lacquer	2	1950–1980 CONTR; 1980–1987 DRMO
Motor Pool (Paint Shop)	798	Solvent	100	1950–1980 SAN; 1980–1987 DRMO
		Thinners	100	1950–1980 SAN; 1980–1987 DRMO
		Strippers (MEK)	25	1950–1980 SAN; 1980–1987 DRMO
		Paint Containers	—	1950–1987 CONTR
		Spray Booth Wastewater	—	1950–1987 SAN

KEY:

CONTR - Disposed of through Commercial contractor
DRMO - Disposed of through the Defense Reutilization and Marketing Office
FTA - Burned at Fire Training Area
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent for silver recovery offbase
SPLY - Turned into Base supply for recovery
STORM - Disposed of in drains leading to storm sewer

Table I. Hazardous Material/Hazardous Waste Disposal Summary: Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana (Continued)

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	ESTIMATED QUANTITIES (GALLONS/YEAR)	METHODS OF TREATMENT/STORAGE/DISPOSAL 1950 1960 1970 1980 1987
Engine Shop	756	PD-680 Solvent	100	CONTR; DRMO
		Trichloroethane	5	DRMO
		Carbon Cleaner	500	CONTR
		JP-4	50	FTA
		PS-661 Solvent	100	FTA
		7808 Oil	200	FTA; CONTR; DRMO
		AVGAS	10	FTA
		Cleaning Compound		DRMO
Weapons Maintenance	740	PD-680 Solvent	300	CONTR; DRMO
		Trichloroethylene	200	CONTR
Aerospace Ground Equipment	768	Hydraulic Oil	300	CONTR; DRMO
		PD-680 Solvent	200	CONTR; DRMO
		Motor Oil	300	CONTR; DRMO
		Batteries	15	CONTR; DRMO
		7808 Oil	100	CONTR; DRMO

KEY:

CONTR - Disposed of through Commercial contractor
DRMO - Disposed of through the Defense Reutilization and Marketing Office
FTA - Burned at Fire Training Area
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent for silver recovery offbase
SPLY - Turned into Base supply for recovery
STORM - Disposed of in drains leading to storm sewer

Source: Indiana
Air National Guard
Base Map, 1984.

Figure 3.

Locations of Sites at Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana.

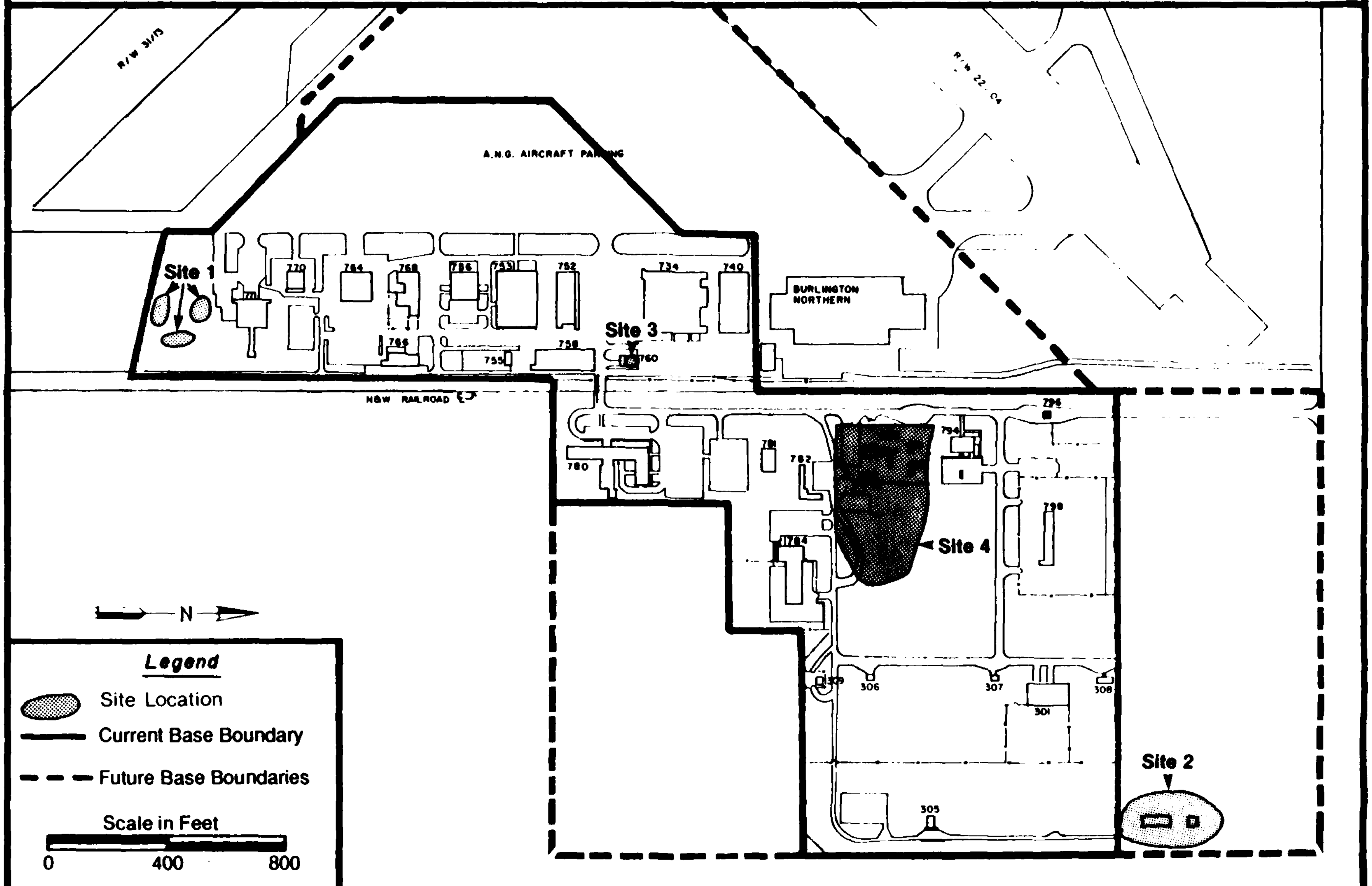


Table 2. Site Hazard Assessment Scores (as Derived from HARM): Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	4	POL Spill Area	48	80	48	1.0	59
2	1	Old Fire Training Areas	53	64	48	1.0	55
3	2	Old Motor Pool Area	48	60	56	1.0	54
4	3	Hazardous Waste Collection Area	53	60	48	1.0	54

Site No. 1 - Old Fire Training Areas (HAS-55)

Three old fire training areas (FTAs) were identified on Base property south of the Hush House (Building No. 771). Between the late 1950s and 1963, fire training exercises were held at two areas, one immediately south of the present-day Hush House and the other just north of the Base boundary (Figure 3). From 1963 to 1972, another FTA was used, located between and east of the previous FTAs. Fire training exercises at these locations were held infrequently because the Base had no fire department until the early 1970s. About 500 gallons of leaded AVGAS, jet fuel, and waste oils were burned per year at each FTA, for a total of approximately 9,500 gallons. Of the flammable liquids released at these FTAs, an estimated 70% were burned during the fire training exercises; the remaining 2,850 gallons of fuel either ran off into surface drainageways or soaked into the soils at this site.

After 1972, the entire area was covered with soil fill and concrete rubble. At the time of the site visit, few signs of the three former FTAs were evident. One area north of the Base boundary was gravelly with more sparse vegetation than surrounding areas.

Site No. 2 - Old Motor Pool Area (HAS-54)

The old motor pool area is within a parcel of land the Base will lease in the near future. The old motor pool was used in the World War II era and the building was demolished prior to 1962. Waste oil and other trash may have been dumped into the former grease pit. Later, transformers containing PCB oil were stored by the city of Fort Wayne on the concrete slab of the old motor pool building. In July 1986, the transformers leaked and the oil ran off the slab into the grass and into an old underground heating oil tank. Subsequently, the tank was capped and the transformers removed. At the time of the site visit, impressions in the concrete slab marked where the transformers had been stored. Areas of dead grass bordered the slab, probably as a result of runoff of contaminated rainwater. A full 55-gallon unmarked drum was standing in the grass beside a smaller adjacent concrete pad. The underground heating oil tank containing PCB-contaminated runoff was no longer capped.

Site No. 3 - Hazardous Waste Collection Area (HAS-54)

The hazardous waste collection area behind Building No. 760 is a 50-foot square gravelled area enclosed by a wooden fence. Since 1954, waste oils, solvents, paints, and thinners from various shops have been collected and stored in drums at this location. At first, the area was grassy; later it was gravelled and fenced. In the past, the drums were picked up by a contractor when full. Since 1985, full drums have been moved to a storage area near Building No. 301 and picked up by DRMO. Drums of waste 7808 oil, hydraulic oil, PD-680 solvent, paints, and thinners are stored on pallets on the gravel. Covered funnels are in the top of each drum. The gravel is very stained and the area smells heavily of oils and solvents. This site was scored on the basis of a "small" quantity release.

Site No. 4 - POL Spill Area (HAS-59)

In 1968, a malfunction in the POL system at Building No. 352 and the nearby pumphouse resulted in a spill of 5,000 to 5,300 gallons of JP-4. The spill escaped the POL facility and and went eastward into the woods and into a storm drain. The JP-4 was discharged from the storm drainage system into Harber Ditch, and began to flow north towards the city of Fort Wayne. Over 200,000 gallons of water was pumped into the ditch to dilute the JP-4. Base personnel noted no vegetative damage in the woods after the spill.

V. CONCLUSIONS

Information obtained through interviews with 22 past and present Base personnel, review of Base records, and field observations has resulted in the identification of four potentially contaminated disposal and/or spill sites on Base property. These sites consist of the following:

Site No. 1 - Old Fire Training Areas
Site No. 2 - Old Motor Pool Area
Site No. 3 - Hazardous Waste Collection Area
Site No. 4 - POL Spill Area

Each of the four sites is potentially contaminated with HM/HW and each exhibits the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned a HAS according to HARM.

VI. RECOMMENDATIONS

In accordance with applicable regulations, further IRP investigation is recommended at each of four identified sites.

GLOSSARY OF TERMS

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

CAMBRIAN - The earliest period of the Paleozoic era, thought to have covered the span of time between 570 and 500 million years ago.

CONTAMINANT - As defined by Section 101(f)(33) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRITICAL HABITAT - The native environment of an animal or plant which, due either to the uniqueness of the organism or the sensitivity of the environment, is susceptible to adverse reactions in response to environmental changes such as may be induced by chemical contaminants.

DEVONIAN - A period of the Paleozoic era (after the Silurian and before the Mississippian), thought to have covered the span of time between 400 and 345 million years ago.

DRIFT - A general term applied to all rock material (clay, silt, sand, gravel, boulders) transported by a glacier and deposited directly by or from the ice, or by running water emanating from a glacier. Drift includes unstratified material (till) and stratified deposits.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the secretary to contitute a pest whose protection would present an overwhelming and overriding risk to man.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the U.S. Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981.)

HAS - Hazard Assessment Score - The score assigned to a site by using U.S. Air Force Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration,, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HYDRAULIC CONDUCTIVITY - The rate at which water can move through a permeable medium.

MICHIGAN BASIN - A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated, e.g. a circular centrocline.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

OVERCONSOLIDATED - Consolidation (of sedimentary material) greater than normal for the existing overburden.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure. Terms describing the permeability of soils are:

Very Slow	-	less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	-	0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	-	0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	-	0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)

Moderately Rapid - 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)

Rapid - 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)

Very Rapid - more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

PHYSIOGRAPHIC PROVINCE - Region of similar structure and climate that has had a unified geomorphic history.

PLEISTOCENE - The first epoch of the Quaternary period; the Pleistocene began two to three million years ago and lasted until the start of the Holocene period some 8,000 years ago.

PRECAMBRIAN - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic; it is equivalent to about 90% of geologic time.

SILURIAN - A period of the Paleozoic, thought to have covered the span of time between 440 and 400 million years ago.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

THREATENED SPECIES - Any species which is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range.

TILL - Unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel and boulders ranging widely in size and shape.

TOPOGRAPHY - The physical features of a district or region; especially the relief and contour of the land.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

BIBLIOGRAPHY

1. Bleuer, N.K., and Moore, M.C. Environmental Geology of Allen County, Indiana. Indiana Geological Survey Special Report 13, 72 p., 1978.

2. Development Plan. Indiana Air National Guard, Fort Wayne Municipal Airport, Fort Wayne, Indiana, 1986.

3. Fetter, C.W. Applied Hydrogeology. Charles E. Merrill Publishing Co., Columbus, OH, 488 p., 1980.

4. Kirschner, F.R., and Zachary, A.L. Soil Survey of Allen County, Indiana. U.S. Dept. of Agriculture Soil Conservation Service, 76 p., 1969.

5. Local Climatological Data - Annual Summary with Comparative Data, Fort Wayne, Indiana. Department of Commerce National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC, 1986.

6. National Oil and Hazardous Substances Contingency Plan, 47 Federal Register 31224-31235, 16 July 1982.

7. Planert, M. Ground-water Availability near Fort Wayne, Allen County, Indiana. U.S. Geological Survey, Water Resources Investigations 80-34, 53 p., 1980.

APPENDIX A

Resumes of HMTC Preliminary Assessment Team

JANET SALYER EMRY

EDUCATION

M.S., geology, Old Dominion University, 1987
B.S. (cum laude), geology, James Madison University, 1983

EXPERIENCE

Three years' technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis.

EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Projects are for the U.S. Air Force and Air National Guard *Installation Restoration Program.*

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

NATASHA M. BROCK

EDUCATION

Graduate work, civil/environmental engineering, University of Maryland, 1987-present

Graduate work, civil/environmental engineering, University of Delaware, 1985-1986

B.S. (cum laude), environmental science, University of the District of Columbia, 1984

Undergraduate work, biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Three years' experience in the environmental and hazardous waste field. Work performed includes remedial investigations/feasibility studies, RCRA facility assessments, comprehensive monitoring evaluations, and remedial facility investigations. Helped develop and test biological and chemical processes used in minimization of hazardous and sanitary waste generation. Researched multiple substrate degradation using aerobic and anaerobic organisms.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in determining rates and extent of contamination, recommending groundwater monitoring procedures, and soil sampling and analysis procedures. In the process of preparing standard operating procedure manuals for quick remedial response to site spills and releases, and PA/RI/FS.

C.C. Johnson & Malhotra, P.C. (1986-1987): Environmental Scientist

Involved as part of a team in performing Remedial Investigations/Feasibility Studies (RI/FS) for EPA Regions I and IV under Resource Conservation and Recovery Act (RCRA) work assignments for REM II projects. Participated on a team involved in RCRA Facility Assessments (RFAs), Comprehensive Monitoring Evaluations (CMEs), and Remedial Facility Investigations (RFIs) for EPA work assignments under RCRA for REM III projects in Regions I and IV. Work included solo oversight observations of field sampling and facility inspections. Additional responsibilities included promotion work, graphic layout, data entry-quality check for various projects. Certified Health & Safety Training Level C.

Work Force Temporary Services (1985-1986): Research Scientist

In working for DuPont's Engineering Test Center, helped in the development and testing of laboratory-scale biological and chemical processes for a division whose main purpose was to reduce the amount of hazardous waste generated. Also worked for Hercules, Inc., with a group involved in polymer use for wastewater treatment for clients in various industrial fields. Specifically involved in product consultation, troubleshooting, and product development.

National Oceanic and Atmospheric Administration (1982-1984): Research Assistant

Involved with an information gathering and distribution center of weather impacts worldwide. Specifically involved in data collection, distribution of data to clients, assessment production and special reports.

KATHRYN A. GLADDEN

EDUCATION

B.S., *chemical engineering (minor in biological sciences)*, University of Washington, 1978

SECURITY CLEARANCE

Secret DOD clearance

EXPERIENCE

Seven years of experience in hazardous waste consulting and plant process engineering. Experience includes development of engineering alternatives for reduction of in-plant effluents and preparation of RCRA background listing documents for the plastics industry.

EMPLOYMENT

Dynamac Corporation (1985-present): Staff Engineer

Performs studies on the feasibility of solvent recycling, including the evaluation of several alternatives. Studies to date have included 15 sites. For each site, prepared reports describing present practice for solvent use and disposal, and conducted economic analyses of options.

Conducted preliminary site investigations and ranking of hazardous waste sites for the U.S. Federal Bureau of Prisons. Prepared reports detailing site investigation findings and recommendations for Phase II monitoring and sampling.

Preparing statement of work for a Phase IV-A remedial action plan for the Air Force's Installation Restoration Program.

Conducted analysis of public comments on Advanced Notice of Public Rulemaking to establish National Primary Drinking Water Regulations for radionuclide contaminants.

Peer Consultants (1984-1985): Staff Engineer

Developed background documents for listing of RCRA hazardous wastes.

Engineering Science (1983-1984): Staff Engineer

Conducted regulatory policy review and technology assessment of transportation and decontamination procedures for acutely hazardous wastes. Project engineer for development of a cost analysis methodology for the U.S. Army Toxic and Hazardous Materials Agency Installation Restoration Program.

<u>Weyerhaeuser Company (1978-1983)</u>: Chemical Engineer

Conducted plant environmental audits to develop in-plant effluent load balances; developed capital alternatives and improved operating procedures for in-plant effluent reduction; developed and implemented recommendations for plant energy conservation and process optimization programs; investigated industrial hygiene impacts of wood pyrolysis air emissions, and performed pilot trials for wood gasification and pyrolysis technology development.

PROFESSIONAL AFFILIATIONS

Tau Beta Pi Engineering Honorary
Society of Women Engineers

NAICHIA YEH

EDUCATION

Ph.D., environmental sciences, The University of Texas at Dallas, 1987
M.S., environmental sciences, The University of Texas at Dallas, 1984
B.S., physics, National Taiwan Normal University, 1978

EXPERIENCE

Nine years of combined academic and technical experience in hazardous waste management and in supplying technological-based solutions to environmental problems, including environmental assessment and evaluation of the nature and the potential environmental impacts of hazardous waste. Has extensive knowledge in computer-aided modeling methodology.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

Involved in the preparation of Preliminary Assessments, Remedial Investigations, and Feasibility Studies (PA/RI/FS) of the Air National Guard Installation Restoration Program (IRP), including record searches, review and evaluation of previous studies, determination of rates and extent of pollution, site prioritization, and remedial action recommendations. Developed a fully computerized version of the U.S. Air Force hazardous assessment rating system (HARM) for the IRP at an Air National Guard Base.

The University of Texas at Dallas (1985-1987): Research Assistant

Participated in an environmental assessment and design project which involved the evaluation of the nature and potential impact of hazardous waste. This project included the design of field and laboratory programs for the collection of data used with computer-aided modeling, the site assessment of the proposed hazardous waste facilities, the field sampling and hazardous waste characterization, and the zoning of polluted site and design of remedial cleanup program. Conceptual design of the hazardous waste disposal plan was based on the onsite investigation and computer modeling results.

The University of Texas at Dallas (1984-1985): Consultant

Instructed students in microcomputer application and computer programming languages. Conducted scientific data processing and data analysis. Developed a regression analysis program with Lotus 1-2-3. The program integrates five regression mechanisms and takes full advantage of Lotus 1-2-3's keyboard macro and graphic abilities.

The University of Texas at Dallas (1983): Teaching Assistant

Taught numerical analysis, and applied mathematics in environmental engineering.

Peitou High School (1979, 1982): Science Teacher

Taught physics, mathematics, computer sciences, and environmental education.

ROC Army (1980-1981): Research Scientist

Conducted environmental surveys and evaluations.

HARDWARE

IBM 360/370., IBM 4341, IBM PC (XT/AT) and compatibles, TI Professional, TI 59, TI 990, and Apple computer family

SOFTWARE

Wylber, Music, CMS, SAS, MS-DOS, CP/M, and most of the popular PC-based software systems such as Lotus 1-2-3, DBaseIII, plus various graphics and data communication utilities; languages used include FORTRAN, BASIC, PL/I, and Pascal

RAYMOND C. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., mechanical engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Twenty-nine years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager

Responsible for activities relating to Phases I, II and IV of the U.S. Air Force Installation Restoration Program including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; and preparation of Air Force Installation Restoration Program Management Guidance.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, D Base III Plus, Framework, Project Scheduler 5000, Harvard Project Manager, Volkswriter, Microsoft Project

MARK D. JOHNSON

EDUCATION

B.S., geology, James Madison University, 1980

EXPERIENCE

Seven years' technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force and the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist/Geologist

Primarily responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program, statements of work for Phase II and Phase IV-A of the Air National Guard's Installation Restoration Program, and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for developing site investigations, remedial investigations and identifying remedial actions. Prepared management guidance document for the Air Force's Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers
British Tunneling Society

APPENDIX B

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. Federal Emergency Management Agency
   Flood Map Distribution Center
   6930 (A-F) San Tomas Road
   Baltimore, Maryland 21227-6227

2. Indiana Department of Natural Resources
   Division of Fish and Wildlife
   607 State Office Building
   Indianapolis, Indiana 46204

3. National Oceanic and Atmospheric Administration
   6001 Executive Boulevard
   Rockville, Maryland 20853

4. U.S. Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092

5. U.S. Soil Conservation Service
   U.S. Department of Agriculture
   Washington, DC 20250

APPENDIX C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for

adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/ maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factory to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ______

LOCATION ______

DATE OF OPERATION OR OCCURRENCE ______

OWNER/OPERATOR ______

COMMENTS/DESCRIPTION ______

SITE RATED BY ______

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to installation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C - confirmed, S - suspected) ______
3. Hazard rating (H - high, M - medium, L - low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 X factor score/3) ______

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		

Subtotals ______ ______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ____________ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

____________ X ____________ = ☐

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)	S = Suspected confidence level
o Verbal reports from interviewer (at least 2) or written information from the records	o No verbal reports or conflicting verbal reports and no written information from the records
o Knowledge of types and quantities of wastes generated by shops and other areas on base	Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200° F	Flash point at 140° F to 200° F	Flash point at 80° F to 140° F	Flash point less than 80° F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS -Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
	L	S	M
50	L	C	L
	M	S	H
	S	C	M
	S	S	H
40	M	S	M
	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

o Confirmed confidence levels (C) can be added.
o Suspected confidence levels (S) can be added.
o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

o Wastes with the same hazard rating can be added.
o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is *greatly suspected of being a source of contamination*.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

Rating Factors	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground Water Contamination -Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX D

Site Factor Rating Criteria and
Hazardous Assessment Rating Forms

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

USAF Hazard Assessment Rating Methodology

1.	RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
	Population within 1,000 feet of site:	0	0
	Distance to nearest well:		
	Site No. 1	1,300 feet	3
	Site No. 2	5,000 feet	2
	Site No. 3	2,800 feet	3
	Site No. 4	3,500 feet	2
	Land use/zoning within 1 mile radius:	Commercial/Agricultural	2
	Distance to Base boundary:		
	Site No. 1	Immediately Adjacent	3
	Site No. 2	100 feet	3
	Site No. 3	400 feet	3
	Site No. 4	100 feet	3
	Critical environments within 1 mile:	Not a critical environment	0
	Water quality of nearest surface water body:	Recreation	1
	Groundwater use of uppermost aquifer:	Used for drinking, municipal water available	2
	Population served by surface water supply within 3 miles downstream of site:	None	0
	Population served by groundwater supply within 3 miles of site:	Between 1 and 50	1
2.	WASTE CHARACTERISTICS CATEGORY		
	Quantity:		
	Site No. 1	2,850 gallons	M
	Site No. 2	Less than 1,000 gallons	S
	Site No. 3	Less than 1,000 gallons	S
	Site No. 4	5,000 to 5,300 gallons	L
	Confidence Level:		
	Site No. 1	Confirmed	C
	Site No. 2	Confirmed	C
	Site No. 3	Confirmed	C
	Site No. 4	Confirmed	C

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Hazard Rating:		
Toxicity		
Site No. 1	Sax Level 3	3
Site No. 2	Sax Level 3	3
Site No. 3	Sax Level 3	3
Site No. 4	Sax Level 3	3
Ignitability		
Site No. 1	Flash point 80 °F to 140 °F	2
Site No. 2	Flash point greater than 200 °F	0
Site No. 3	Flash point 80 °F to 140 °F	2
Site No. 4	Flash point 80 °F to 140 °F	2
Radioactivity	At or below background levels	0
Persistance Multiplier		
Site No. 1	Straight chain hydrocarbons	0.8
Site No. 2	Metals, polycyclic compounds, halogenated hydrocarbons	1.0
Site No. 3	Metals, polycyclic compounds, halogenated hydrocarbons	1.0
Site No. 4	Straight chain hydrocarbons	0.8
Physical State Multiplier		
Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0
Site No. 3	Liquid	1.0
Site No. 4	Liquid	1.0

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. PATHWAYS CATEGORY

Surface Water Migration

Distance to nearest surface water:

Site No. 1	Between 501 feet and 2,000 feet	2
Site No. 2	Between 0 feet and 500 feet	3
Site No. 3	Between 501 feet and 2,000 feet	2
Site No. 4	Between 501 feet and 2,000 feet	2
Net precipitaiion:	+3.3 inches	1
Surface erosion:	Slight	1
Surface permeability:		
Site No. 1	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	1
Site No. 2	5.6×10^{-4} cm/sec to 1.8×10^{-3} cm/sec	1
Site No. 3	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	1
Site No. 4	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	1
Rainfall intensity:	2.3 inches	2
Flooding:	Beyond 100-year flood-plain	0

122nd Tactical Fighter Wing
Indiana Air National Guard
Fort Wayne Municipal Airport
Fort Wayne, Indiana

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. PATHWAYS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Groundwater Migration		
Depth to groundwater:	Between 11 feet and 50 feet	2
Net precipitation:	+3.3 inches	1
Soil permeability:		
Site No. 1	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	2
Site No. 2	5.6×10^{-4} cm/sec to 1.8×10^{-3} cm/sec	2
Site No. 3	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	2
Site No. 4	1.4×10^{-4} cm/sec to 5.6×10^{-4} cm/sec	2
Subsurface flow:	Bottom of site occasionally submerged	1
Direct access to groundwater:	Low risk	1

4. WASTE MANAGEMENT PRACTICES CATEGORY

Practice:

Site No. 1	No containment	1.0
Site No. 2	No containment	1.0
Site No. 3	No containment	1.0
Site No. 4	No containment	1.0

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	OLD FIRE TRAINING AREA (SITE 1)
LOCATION	INDIANA AIR NATIONAL GUARD, FORT WAYNE, INDIANA
DATE OF OPERATION/OCCURRENCE	LATE 1950s TO 1972
OWNER/OPERATOR	122ND TFW
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		96	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 53

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (M)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (80)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(80)(0.8) = (64)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(64)(1) = (64)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <LESS THEN 80> EXISTS, PROCEED TO B.

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	2	8	16	24
SUBTOTALS				52	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					48

2. FLOODING

		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				54	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					47

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(48)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(53)
WASTE CHARACTERISTICS	(64)
PATHWAYS	(48)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(55)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(55)	(1)	=	55

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	OLD MOTOR POOL AREA (SITE 2)
LOCATION	INDIANA AIR NATIONAL GUARD, FORT WAYNE, INDIANA
DATE OF OPERATION/OCCURRENCE	LATE 1950s TO 1972
OWNER/OPERATOR	122ND TFW
COMMENTS/DESCRIPTION	
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		86	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 48

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A	x PERSISTENCE FACTOR		SUBSCORE B
(60)	(1)	=	(60)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B	x PHYSICAL STATE MULTIPLIER	=	WASTE CHARACTERISTICS SUBSCORE
(60)	(1)	=	(60)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <LESS THEN 80> EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	1	6	6	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	2	8	16	24
SUBTOTALS				60	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					56

2. FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				54	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					47

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(56)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(48)
WASTE CHARACTERISTICS	(60)
PATHWAYS	(56)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(54)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(54)	(1)	=	54

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE HAZARDOUS WASTE COLLECTION AREA (SITE 3)
LOCATION INDIANA AIR NATIONAL GUARD, FORT WAYNE, INDIANA
DATE OF OPERATION/OCCURRENCE LATE 1950s TO 1972
OWNER/OPERATOR 122ND TFW
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		96	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 53

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(1) = (60)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(60)(1) = (60)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF <100 POINTS FOR DIRECT EVIDENCE> OR <80 POINTS FOR INDIRECT EVIDENCE>. IF DIRECT EVIDENCE <100> EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE <LESS THEN 80> EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	2	8	16	24
SUBTOTALS				52	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					48

2. FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				54	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					47

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(48)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(53)
WASTE CHARACTERISTICS	(60)
PATHWAYS	(48)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(54)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x	FINAL SCORE
(54)	(1)	= 54

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: POL SPILL AREA (SITE 4)
LOCATION: INDIANA AIR NATIONAL GUARD, FORT WAYNE, INDIANA
DATE OF OPERATION/OCCURRENCE: LATE 1950s TO 1972
OWNER/OPERATOR: 122ND TFW
COMMENTS/DESCRIPTION:
RATED BY: HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	2	10	20	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	2	3	6	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		86	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 48

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (L)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (100)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(100)(0.8) = (80)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(80)(1) = (80)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B.
(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	2	8	16	24
SUBTOTALS				52	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					48

2. FLOODING

FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	1	6	6	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				54	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					47

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(48)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(48)
WASTE CHARACTERISTICS	(80)
PATHWAYS	(48)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(59)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(59)	(1)	=	59

=========